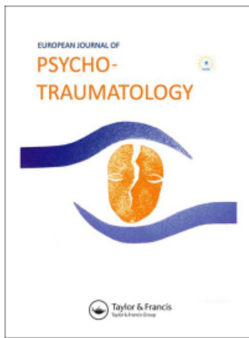

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European Journal of Psychotraumatology

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/zept20

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To cite this article: Mariëlle Hoekstra, Nancy van Veelen, Jorien van Leeuwen, Mirjam J. Nijdam & Eric Vermetten (2023) 3MDR treatment in an adolescent with PTSD: a case report, European Journal of Psychotraumatology, 14:2, 2272487, DOI: 10.1080/20008066.2023.2272487

To link to this article: https://doi.org/10.1080/20008066.2023.2272487

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EUROPEAN JOURNAL OF PSYCHOTRAUMATOLOGY
2023, VOL. 14, NO. 2, 2272487
https://doi.org/10.1080/20008066.2023.2272487

CASE REPORT

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3MDR treatment in an adolescent with PTSD: a case report

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ABSTRACT

Background: As Posttraumatic stress disorder (PTSD) in adolescents significantly impacts their well-being, effective treatment is of great importance. Little is known, however, about the novel, multi-modal virtual reality supported, exposure-based psychotherapeutic interventions such as 3MDR in this population.
Objective: To describe the 3MDR treatment of an adolescent with PTSD who did not respond to previous exposure-based PTSD interventions.
Method: A 14-year-old girl diagnosed with PTSD received six sessions of 3MDR embedded in family therapy.
Result: The patient tolerated the 3MDR intervention very well. Personalized music and self-selected pictures appeared to be a good fit, contributing to enhanced engagement in and adherence to the therapy. She no longer met criteria for PTSD post-intervention, and at 18 months follow-up.
Conclusion: This case report suggests that 3MDR has potential as a trauma treatment for adolescents with treatment-resistant PTSD.

Tratamiento 3MDR en una adolescente con trastorno de estrés postraumático: reporte de un caso

Antecedentes: El trastorno de estrés postraumático (TEPT) en adolescentes afecta significativamente su bienestar y el tratamiento eficaz es de gran importancia. Se sabe poco sobre nuevas intervenciones basadas en exposición a la realidad virtual, como 3MDR, dirigidas a múltiples modalidades en esta población.
Objetivo: Describimos el tratamiento de una adolescente con TEPT que no respondió al tratamiento previo basado en exposición para TEPT.
Método: Reportamos sobre una niña de 14 años, diagnosticada con trastorno de estrés postraumático que fue tratada con 3MDR integrado en terapia familiar.
Resultado: El paciente toleró muy bien la intervención de exposición basada en realidad virtual. Los elementos de música personalizada e imágenes seleccionadas por ellos mismos parecieron encajar bien, contribuyendo a una mayor participación y adherencia a la terapia. Después del tratamiento, ya no cumplía los criterios de trastorno de estrés postraumático, que se mantuvo hasta 18 meses después del tratamiento.
Conclusión: Este informe de caso sugiere que 3MDR tiene potencial como tratamiento de trauma en Adolescentes con trastorno de estrés postraumático resistente al tratamiento.

一个PTSD青少年患者的 3MDR 治疗：病例报告

背景: 青少年创伤后应激障碍（PTSD）严重影响他们的健康，有效的治疗非常重要。人们对基于虚拟现实暴露的新型干预措施知之甚少，例如针对该人群的多种模式的 3MDR。
目的: 我们描述了一名患有 PTSD 的青少年的治疗方法，该青少年对之前基于暴露的 PTSD 治疗没有反应。
方法: 我们报告了一名被诊断患有 PTSD的14 岁女孩，她在家庭治疗中接受了 3MDR 治疗。
结果: 患者对基于虚拟现实的暴露干预耐受性很好。个性化音乐和自选图片的元素似乎很合适，有助于增强治疗的参与度和依从性。治疗后，她不再符合PTSD标准，一直维持到治疗后18个月。
结论: 本病例报告表明 3MDR作为难治性 PTSD 青少年创伤治疗方法的潜力。

ARTICLE HISTORY
Received 29 January 2023
Revised 28 May 2023
Accepted 29 May 2023

KEYWORDS
PTSD; 3MDR; adolescent; treatment; trauma

PALABRAS CLAVE
Trastorno de estrés postraumático; 3MDR; adolescente; Tratamiento; trauma

关键词
PTSD; 3MDR; 青少年; 治疗; 创伤

HIGHLIGHTS
- Trauma-focused therapy for youngsters is often complicated, with a high percentage of dropouts.
- Elements of 3MDR such as walking, self-selected pictures, and personalized music are a good fit, contributing to enhanced engagement in and adherence to 3MDR therapy.
- 3MDR has potential as a trauma treatment for adolescents with treatment-resistant PTSD.

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1. Background

Posttraumatic stress disorder (PTSD) affects approximately 16% of the adolescent population, defined as 19 years or younger, after being exposed to single or multiple traumatic events (Alisic et al., 2014). Effective treatment of this population is extremely important, as adverse childhood experiences are associated with long-lasting determinants, such as higher rates of health risk behaviour, mental illness, social dysfunction, disability, transgenerational transmission, suicide attempts, and increased health care costs as compared to populations who were not exposed (Walsh et al., 2019). Trauma-focused therapy for youngsters is often complicated, with a high percentage of treatment dropouts, in some reports ranging from 15.5 to 25% (Simmons et al., 2021).

Several studies have suggested that treatment adherence could be increased by personalizing and intensifying the therapy programme, among which Virtual Reality (VR) interventions are a promising option (Eshuis et al., 2021). One example in which VR is implemented in trauma therapy is multi-modal motion-assisted memory desensitization and reconsolidation (3MDR). Three RCTs have demonstrated that 3MDR is an effective treatment for PTSD in military populations (Bisson et al., 2020; Roy et al., 2022; van Gelderen et al., 2020). 3MDR combines exposure in a virtual world with walking on a treadmill (van Gelderen et al., 2018). This is supported by self-selected personal images and music associated with the traumatic event. Self-selected images and music have been shown to contribute to personalization of treatment, and engage the individual in their therapeutic process (Hamilton et al., 2021). Walking, music, and images are therefore hypothesized to increase immersiveness and engagement in therapy, which may support overcoming cognitive avoidance.

2. Objective

We aimed to explore the feasibility of 3MDR for adolescents with treatment-resistant PTSD. This case report, which was not conducted as part of another study, is of a 14-year-old girl diagnosed with PTSD and comorbid severe depression who had previously received various trauma-focused treatments. As this is a case report, ethics committee approval was not deemed necessary. Permission was obtained from the patient and her parents to publish this case report.

3. Case report

3.1. Case introduction and presentation

A 14-year-old Caucasian Dutch female, Petra (pseudonym), was referred to the outpatient clinic and diagnosed with PTSD according to DSM-5 criteria. She provided informed consent for this case report. Born as the first child in the family, Petra has one sister. She followed intermediate general secondary education. Petra had been diagnosed with unspecified health problems at the age of nine, which required several hospital visits that she identified as traumatic as she was held against her will during medical assessments. At the age of ten, Petra found her mother after a drug overdose and witnessed her being hospitalized in psychiatric care. At age eleven, Petra was involved in a life-threatening car accident in which all of her family members were involved. She presented with irritability and anger problems, was very suspicious, defensive, anxious, and with low mood; had active recurring suicidal thoughts; and had written several farewell letters. She suffered from frequent intrusive symptoms and nightmares of the accident and of seeing her mother with the overdose.

3.2. Treatment history and case conceptualization

Petra was initially offered a combination of eye movement desensitization and reconsolidation (EMDR) and made a storyline with text and photos about her traumas in trauma-focused cognitive behavioural therapy (TF-CBT). The focus was to process the car incident. While initial treatment was successful, the accident also triggered traumatic events of her childhood, resulting in persistent PTSD symptoms. After these two intervention trials without symptom reduction, 3MDR treatment was offered to allow for more effective engagement in processing the traumatic events.

3.3. 3MDR treatment approach

The 3MDR protocol was adjusted for this case. The exposure sessions were shortened to include four pictures. A minimum of two positive pictures were used in every session instead of solely those associated with the traumatic event. Beforehand, Petra was invited to select six pictures related to her traumatic events and three positive pictures. She also chose two musical pieces; one related to the time of the traumatic events and one to the present time. Every session started with a ‘mental warming up’ in which music was played related to the traumatic events. In the first session, Petra was exposed to three positive pictures. In sessions 2-7, the number of pictures used for exposure increased to four, and each picture was processed for 5–7 min. Session numbers 8 and 9 included only positive pictures because these sessions focused on strengthening her self-reliance, serving as a reward for the traumatic working through. Each session ended with a ‘cooling down’ during which Petra

listened to the musical piece associated with the present. Petra and the therapist reflected for 10–15 min on acquired gains and new perspectives after every session.

3.4. Observations during 3MDR

3.4.1. Session 1

Petra had selected the pictures of her most significant traumas in the book she made. She actively participated in the selection of pictures and music, was motivated and creative in this process, and utilized several digital platforms. She chose three positive pictures of her family, friends, and of a holiday in the first platform session. She realized the absence of luck and of being lighthearted as the most prominent cognitions during this session. This induced sadness and she reported that the music she had chosen complemented her emotions, which enabled her to express those feelings. In particular, the song lyrics: 'Look, I've been through so much pain. And it's hard to maintain, and a smile on my face' (see Figure 1*).*

3.4.2. Session 2–9

In the second and third sessions, Petra was exposed to negative (traumatic) pictures, representing not only her index trauma but also the time of her depression, the loss of her grandfather, and the traumatic resuscitation of one of her family members (see Figure 2). The therapist observed that she tried to move away from the screen during walking. Her prominent cognitive labels during exposure were the heaviness and hopelessness accompanying her depressive period. She produced opposing labels of being stressed and panicking during the resuscitation as well as a label where she pretended to be able to manage the situation. The label related to the loss of her grandfather represented the lack of a support figure in her life. For the first time, she was able to face the traumatic memories and bear the accompanying emotions of loneliness, anxiety, and panic. She could feel these emotions in her body, surrender to them, and allow herself to feel sadness. At session completion, the positive pictures from session one evoked a feeling of absence of carefreeness.

In the fourth through sixth sessions, Petra was exposed to images with similar themes as sessions two and three. Prominent cognitive labels she gave referred to the notion that the traumatic events belonged in the past, accompanied by feelings of relief and happiness. A remarkable switch in her cognitive label was noted: 'it is over, we are still alive, and I can focus on the future and my own development.' She was able to distance herself from the traumatic memories and now experienced less anxiety in the processing of the resuscitation of her mother. Covid-19 restrictions forced a pause of almost two months before she could move on with sessions. After session six, the therapist discussed the presence of a family member in her treatment process. Petra preferred not to go there, as she emphasized it was her own process. She claimed her autonomy and did not want to

Mental warming-up music (first platform session)

Lyrics of song 'Home', by Bebe Rexha, Machine Gun Kelly and X Ambassadors

" Look, I been through so much pain
And it's hard to maintain any smile on my face
'Cause there's madness on my brain
So I gotta make it back, but my home ain't on the map
[...]
I'm trying to find
Home
A place where I can go
To take this off my shoulders
Someone take me home
Someone take me
I found no cure for the loneliness
I found no cure for the sickness
Nothing here feels like home
Crowded streets, but I'm all alone."

Figure 1. Part of the lyrics of the self-selected music song in the first platform session. The lyrics supported Petra to express and experience the emotions that were associated with the traumatic events.

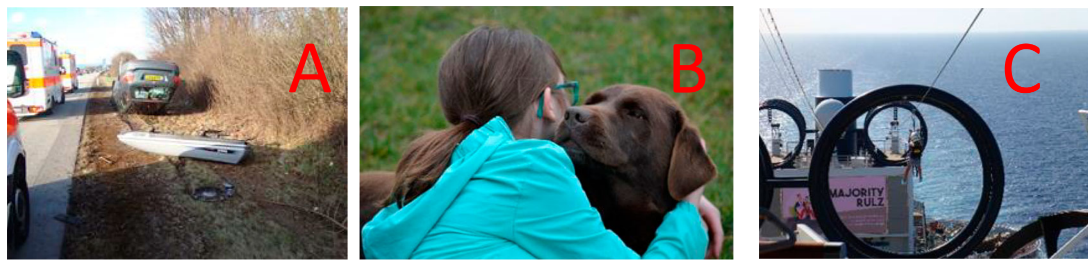

Figure 2. Selection of pictures that were used during the 3MDR exposure sessions. (A): A car accident. Negative label: 'The memory does not go away; I don't know everything I want to know to process my memory; the perpetrator disappears, so I can not process.' Positive label: ' I can tell some of the details I can remember now; It feels like I survived; it belongs to the past; I can live my life; This memory is a part of my story, I close this part of my book, and I will read it when I want to read it, and I will no longer be overwhelmed with flashbacks.' (B) Depressive times. Negative label: 'Every evening I had suicidal thoughts; I can feel it again, the sadness, exhaustion, and tiredness; I did not fit in with my peers; I am secluded.' Positive label: 'The sun is also shining for me, and the darkness is in the past; I feel happy; I feel relaxation in my body; For the first time, I am optimistic about my future; I am a free girl, and I wish I light tread I walk on the treadmill; I can dream about the future.' (C) Resilience. Positive label: 'The shadow is the past; there is a place for me in the world; I feel space within myself for who I am; I can shine'.

worry about her mother as she preferred the focus to remain on herself.

In session seven, however, the 'working through' focused on the relationship with her mother, and she selected images of her and her mother. The prominent cognitive labels during exposure were grief and farewell. Petra grieved the loss of the mother she had before her mother became ill and realized how profoundly this had impacted her. This evoked the feeling of loneliness, being unnoticeable, anger, and sadness that she now could locate in her body. It also led to a sense of acceptance, accompanied by experiencing her strength and a feeling that she could handle it. Finally, Petra reflected on her role in her family and was able to depart from the position of protector for her mother and little sister.

The two subsequent sessions, eight and nine, focused on empowerment, and Petra walked with a lighter tread on the treadmill. The pictures were identical to the ones shown in the first session, representing a happy family (see Figure 2). Her cognitive labels shifted: 'I can do it; I am strong and powerful.' She also realized what she had gone through: 'I have done it, I have been through it, and I have enough power to continue.' This was well-reflected in the music she had selected for these sessions, as the lyrics of the music songs were representative of power (see Figure 3). The earlier feelings of loneliness and feeling dead inside had vanished.

After finalizing the 3MDR treatment, Petra and her family joined five sessions of a multi-family therapy group. Her role within her family was discussed during these therapy sessions. She recognized how much she had grown when she compared herself with the other children in the group. As a result, she did not receive further treatment, and she was discharged from therapy.

3.4.3. Long-term follow-up

Petra was recontacted 18 months after finalizing the 3MDR treatment. She reported that the PTSD symptoms remained near to absent and that her traumatic events had transformed into memories. Petra was

Mental cooling-down music (final platform session)

Lyrics from Avril Lavigne - We are Warriors

" And we won't bow, we won't break
No, we're not afraid to do whatever it takes
We'll never bow, we'll never break
'Cause we are warriors, we'll fight for our lives
Like soldiers all through the night
And we won't give up, we will survive, we are warriors
And we're stronger, that's why we're alive
We will conquer, time after time
We'll never falter, we will survive, we are warriors. "

Figure 3. Lyrics quote of the self-selected music song in the final platform session. The melody and lyrics represent the empowerment and the strength Petra gained during the 3MDR therapy.

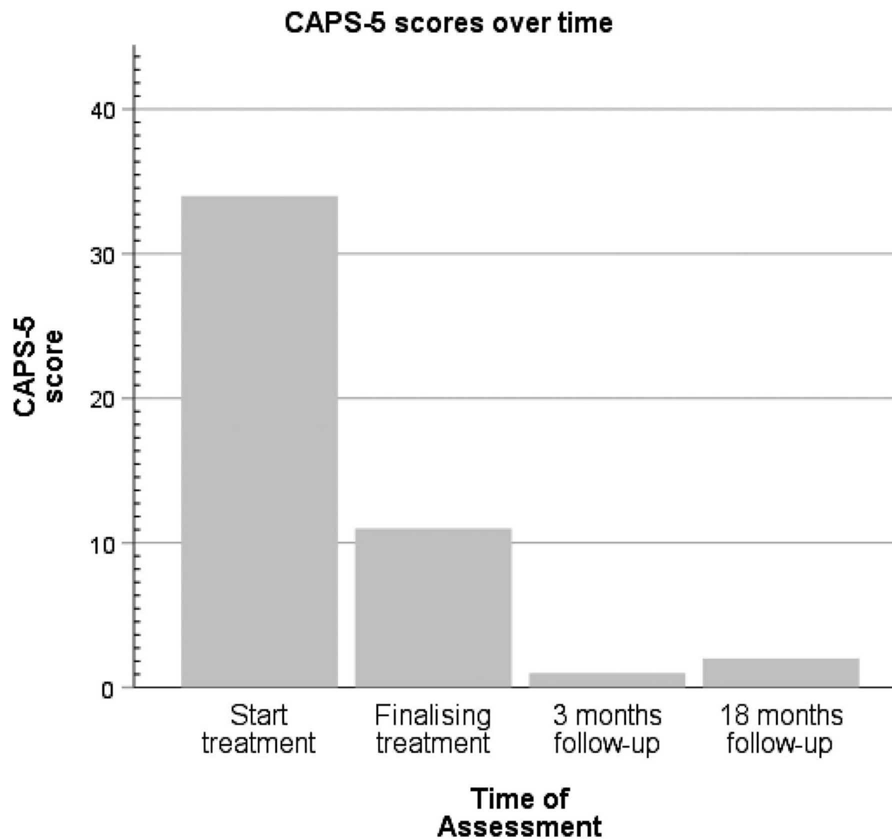

Figure 4. CAPS-score over time of the presented case report. The y-axis displays the CAPS-5 score, and the x-axis the assessment time. Respectively: T0, assessment at the baseline measurement before 3MDR treatment, T1 assessment directly after finalizing the 3MDR treatment, T2 assessment at three months follow-ups, and T3 assessment at long-term follow-up 18 months.

doing well in school. She remembered the 3MDR treatment as overwhelming and emotionally intense because, in this setting, she was unable to avoid and 'pretend,' as she had done in her EMDR sessions. However, in contrast to EMDR, she did not worry about what impression she was making on the therapist during 3MDR, which helped her open up and let go of defenses. She described the 3MDR platform sessions as facing herself: 'It was a relief to no longer pretend because I was unable to ignore or avoid the images,' and 'When the music played, I broke into a thousand pieces.'

The selection process of the music and pictures came naturally to her as her emotions were closely connected to those pictures. Sharing pictures on Instagram with friends was part of her preferred communication style; therefore, it felt comfortable engaging with this modality in therapy. Music facilitated her expression of emotions and marked the start and end of the therapy session for her. Furthermore, the virtual tunnel in 3MDR gave her the impression that she could really walk out of it and that it would be over at the end of the tunnel, which she experienced as encouraging. Reflecting on herself and her family, she concluded: 'Before I started 3MDR and family therapy, me and my family were all little islands, and now we are together, we are a family again.'

4. Assessments

PTSD symptom severity was assessed with CAPS-5 at four-time points: before the start of 3MDR, directly after finalizing 3MDR, three months after completion of 3MDR, and at 18-months follow-up. While her CAPS-5 score was 34 at the beginning of treatment, she did not meet the criteria for PTSD post-intervention, scoring 11 on the CAPS-5 after completing 3MDR, 1 after three months, and 2 after 18 months [see Figure 4].

5. Discussion

This case report demonstrates the successful delivery of 3MDR with a 14-year-old girl with treatment-resistant PTSD. Before 3MDR, she had received EMDR and TF-CBT with only limited symptom reduction. She showed a clear reduction in PTSD symptom severity after ten sessions of 3MDR and no longer met criteria for PTSD. At 18 months post-3MDR, her PTSD symptom severity remained close to zero.

Comparing 3MDR with other PTSD treatments in the adolescent population, 3MDR has the potential to overcome the identified risk factors that are associated with premature dropout or limited treatment effect, such as a high treatment demand, low perceived treatment relevance, reduced treatment adherence and

cognitive avoidance (Tang et al., 2021). The structured 3MDR treatment protocol is very intense. In 3MDR therapy, the therapist's role is also slightly different since the therapist aims to coach and guide patients through trauma processing with a 'can-do' attitude (Jones et al., 2022). In the current case, the support and empathy of the therapist had a very positive influence on the therapeutic relationship, which is deemed very important for a positive treatment outcome, specifically in young patients (Labouliere et al., 2017). 3MDR's multi-modal approach may also have increased the perceived treatment relevance since the current population of adolescents growing up in a digital world, which includes online communication with pictures and almost unlimited availability of music. Implementation of VR in cognitive behaviour therapy has shown to result in increased treatment motivation among children (Tozzi et al., 2018); our case study shows that this is likely also true for adolescents. Moreover, in 3MDR, the personalized images and music have two additional beneficial effects: (1) the patients select the images and music themselves, which increases treatment adherence by actively choosing their own trauma exposure components; (2) the utilization of personalized images and music in exposure and walking towards them contributes to overcoming avoidance (Bisson et al., 2020) and defense mechanisms characteristic for adolescents.

This case report illustrates that 3MDR was effective in resolving treatment-resistant PTSD and comorbid depression in a 14-year-old female. The adult 3MDR protocol needed only minor modifications to be tailored to the needs of an adolescent. This reflects the versatile nature of 3MDR as a promising novel treatment for populations other than the adult veteran population it was initially designed for. We see this case as an incentive for further systematic research to expand and replicate these findings. Future studies of 3MDR with children and adolescents will also need to consider the dosing and content of the exposure as well as the involvement of parents in the therapeutic process. These studies can yield important information to provide personalized and immersive treatment options by integrating 3MDR into the care of children and adolescents with PTSD.

Acknowledgements

A special thanks to Petra, who approved this case report about her course of treatment and her life story. Also, acknowledgment to Dr Suzette Brémault-Phillips of University Alberta, Edmonton, for her comments on this case report. Acknowledgment to the Nypels-Tans PTSD Fund of Leiden University to Dr Vermetten.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

Anonymized data of the psychometrics evaluation can be requested through the corresponding author.

References

Alisic, E., Zalta, A. K., van Wesel, F., Larsen, S. E., Hafstad, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: Meta-analysis. *British Journal of Psychiatry*, *204*(5), 335–340. https://doi.org/10.1192/bjp.bp.113.131227

Bisson, J. I., van Deursen, R., Hannigan, B., Kitchiner, N., Barawi, K., Jones, K., Pickles, T., Skipper, J., Young, C., Abbott, L. R., van Gelderen, M., Nijdam, M. J., & Vermetten, E. (2020). Randomized controlled trial of multi-modular motion-assisted memory desensitization and reconsolidation (3MDR) for male military veterans with treatment-resistant post-traumatic stress disorder. *Acta Psychiatrica Scandinavica*, *142*(2), 141–151. https://doi.org/10.1111/acps.13200

Eshuis, L. V., van Gelderen, M. J., van Zuiden, M., Nijdam, M. J., Vermetten, E., Olff, M., & Bakker, A. (2021). Efficacy of immersive PTSD treatments: A systematic review of virtual and augmented reality exposure therapy and a meta-analysis of virtual reality exposure therapy. *Journal of Psychiatric Research*, *143*, 516–527. https://doi.org/10.1016/j.jpsychires.2020.11.030

Hamilton, T., Burback, L., Smith-MacDonald, L., Jones, C., Brown, M. R., Mikolas, C., Tang, E., O'Toole, K., Vergis, P., & Merino, A. (2021). Moving toward and through trauma: Participant experiences of multi-modal motion-assisted memory desensitization and reconsolidation (3MDR). *Frontiers in Psychiatry*, *12*, 2357.

Jones, C., Smith-MacDonald, L., Van Veelen, N., VanderLaan, A., Kaneva, Z., Dunleavy, R. S., Hamilton, T., Vermetten, E., & Bremault-Phillips, S. (2022). Therapist and operator experiences utilizing multi-modal motion-assisted Memory Desensitization and Reconsolidation (3MDR) for treatment of combat related posttraumatic stress disorder amongst military and veteran populations. *European Journal of Psychotraumatology*, *13*(1), 2062996. https://doi.org/10.1080/20008198.2022.2062996

Labouliere, C. D., Reyes, J., Shirk, S., & Karver, M. (2017). Therapeutic alliance with depressed adolescents: Predictor or outcome? Disentangling temporal confounds to understand early improvement. *Journal of Clinical Child & Adolescent Psychology*, *46*(4), 600–610. https://doi.org/10.1080/15374416.2015.1041594

Roy, M. J., Bellini, P., Kruger, S. E., Dunbar, K., Atallah, H., Haight, T., & Vermetten, E. (2022). Randomized controlled trial of motion-assisted exposure therapy for post-traumatic stress disorder after mild traumatic brain injury, with and without an eye movement task. *Frontiers in Virtual Reality*, 171.

Simmons, C., Meiser-Stedman, R., Baily, H., & Beazley, P. (2021). A meta-analysis of dropout from evidence-based psychological treatment for post-traumatic stress disorder (PTSD) in children and young people. *European Journal of Psychotraumatology*, *12*(1), 1947570. https://doi.org/10.1080/20008198.2021.1947570

Tang, E., Jones, C., Smith-MacDonald, L., Brown, M. R., Vermetten, E. H., & Brémault-Phillips, S. (2021). Decreased emotional dysregulation following multi-modal motion-assisted memory desensitization and

reconsolidation therapy (3MDR): identifying possible driving factors in remediation of treatment-resistant PTSD. *International Journal of Environmental Research and Public Health*, *18*(22), 12243. https://doi.org/10.3390/ijerph182212243

Tozzi, F., Nicolaidou, I., Galani, A., & Antoniades, A. (2018). Ehealth interventions for anxiety management targeting young children and adolescents: Exploratory review. *JMIR Pediatrics and Parenting*, *1*(1), e5–e5. https://doi.org/10.2196/pediatrics.7248

van Gelderen, M. J., Nijdam, M. J., Haagen, J. F. G., & Vermetten, E. (2020). Interactive motion-assisted exposure therapy for veterans with treatment-resistant posttraumatic stress disorder: A randomized controlled trial. *Psychotherapy and Psychosomatics*, *89*(4), 215–227. https://doi.org/10.1159/000505977

van Gelderen, M. J., Nijdam, M. J., & Vermetten, E. (2018). An innovative framework for delivering psychotherapy to patients with treatment-resistant posttraumatic stress disorder: Rationale for interactive motion-assisted therapy. *Frontiers in Psychiatry*, *9*, 176. https://doi.org/10.3389/fpsyt.2018.00176

Walsh, D., McCartney, G., Smith, M., & Armour, G. (2019). Relationship between childhood socioeconomic position and adverse childhood experiences (ACEs): A systematic review. *Journal of Epidemiology and Community Health*, *73*(12), 1087–1093. https://doi.org/10.1136/jech-2019-212738